GLOBAL COMMISSION on the ECONOMICS OF WATER

Policy Brief: Agricultural Trade and the Economics of Water

Inspired by the final report of Global Commission on the Economics of Water – ***The Economics of Water: Valuing the Hydrological Cycle as a Global Common Good.***

The Global Commission's report sets out the shifts required to drive radical changes in how water is valued, managed, and used. The new economics of water begins by recognising that the water cycle must now be governed as a global common good, that can only be fixed collectively, through concerted action in every country, collaboration across boundaries and cultures, and for benefits that will be felt everywhere.

This policy brief looks at the implications of the Global Commission's findings in the light of agricultural trade and how virtual water trade can serve as a stabiliser to increase efficiency, equity and environmental sustainability in global water use.

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Key Messages

- Trade is one channel through which water connects countries across the globe: invisibly embedded in the goods and services we trade is a certain amount of water required to produce them. This is referred to as the virtual water trade.

- Trade in virtual water is a powerful tool for global water management, promoting more efficient use of water resources worldwide and alleviating water stress in regions grappling with scarcity. This is so when trade reflects the competitive advantage of countries in terms of water endowment (ideally, when prices of traded goods reflect the opportunity cost of using water).

- To ensure virtual water trade promotes efficient, equitable, and sustainable water use, domestic and trade policies must reflect the true value of water. In line with the emphasis of the Global Commission on the Economics of Water on the hydrological cycle, this should capture the value of land that keeps moisture in soils.

- When the pricing of water-intensive commodities does not reflect scarcity and pressure on water resources, demand can intensify pressure on scarce water resources and contribute to worsening water shortages.

- Unstable or declining supplies of freshwater – green and blue – are poised to disrupt global trade, especially agricultural trade.

- Shifting trade patterns to increase efficiency and environmental sustainability in global freshwater use may negatively impact local economies, and small-scale farmers in particular: we need to ensure a just transition for these communities.

Recognising virtual water trade

The global hydrological cycle is the bloodstream of our planet and provides the foundation of our economies, from the production of pharmaceuticals and generation of energy to powering our food systems and cooling data centres. Consequently, 'virtual water' is embedded in the products and services we trade.

Virtual water has become important in assessing global trade dynamics and refers to the idea that the amount of water – green or blue – used to produce goods and services, considering the full value chain, is traded "virtually" when these products are consumed in a different location than where they are produced. Approximately 1.8 trillion cubic metres of green and blue water are traded this way each year through crops alone [1]. This means that virtual water trade remains a factor of global interconnectedness and can expand our understanding of global water dynamics and imbalances.

Similarly, it would seem appropriate to document how trade affects land use and the capacity of soils to retain moisture (i.e., green water), highlighting environmental and social costs.

Mobilising trade as a stabilizer

Trade in virtual water could be a powerful tool for global water management by promoting more efficient use of water resources worldwide and alleviating water stress in specific regions grappling with scarcity. By importing water-intensive products, countries with scarce water resources can conserve their water while meeting their needs for those products. Conversely, countries rich in water resources can export water-intensive goods, effectively exporting virtual water. Virtual water trade can particularly help to address food security issues, including potential declines in agricultural productivity driven by climate change and a hydrological cycle out of balance, by allowing water-constrained countries to transition towards new varieties of crops.

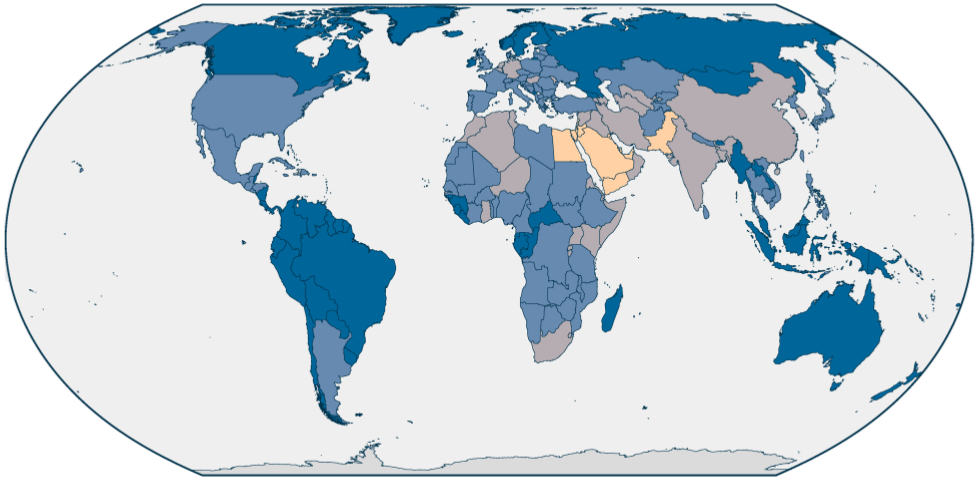
Estimates suggest that trade in agricultural products increases efficiency in both global water use and land use, yielding savings of 8% (green and blue water use combined) and 5% respectively compared to all imported agricultural products being produced domestically [2].

Current impact of trade on green and blue water

The hydrological cycle comprises "blue" and "green" water. Blue water – in rivers, lakes, and aquifers – is available to humans as an extractable resource for drinking water, as well as manufacturing, cooling, and irrigation in agriculture. Green water – the moisture held in soil and plants, which evaporates and transpires into the air – supports all terrestrial ecosystems and subsequent nature-based carbon sequestration, and contributes to rainfed agriculture, as well as irrigated agriculture where irrigation complements rainfall. Nearly half of terrestrial rainfall originates from land: green water flows are therefore critical for sustaining precipitation.

In 2016, 9% of the total virtual water volume traded was contributed by blue water, while green water made up the majority, corresponding to 91%. Virtual water trade makes it possible to connect the green and blue water footprint of production to the water footprint of consumption, wherever it occurs. [3]. Trade can thus highlight environmental costs and help inform the direction of change.

Figure 1: Blue water scarcity

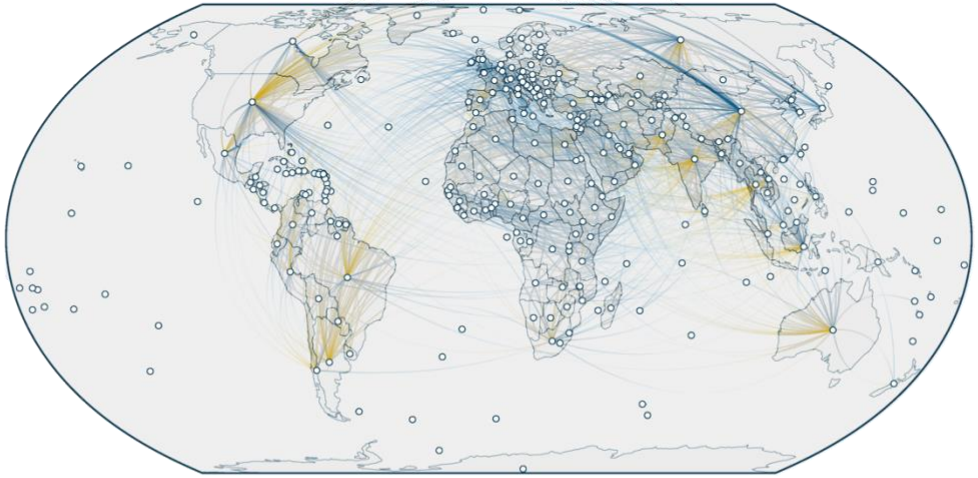


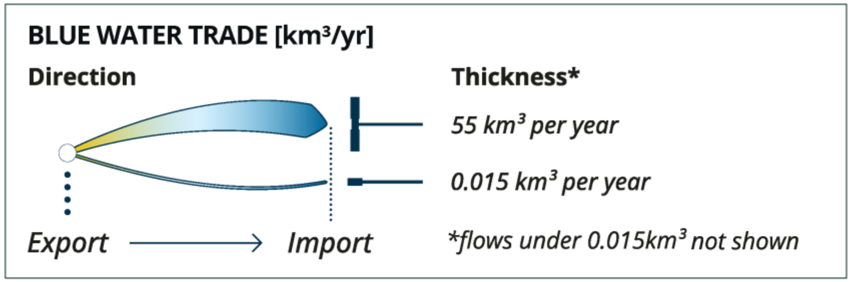
BLUE WATER AVAILABILITY INDICATOR [M³/CAP/YR]

- **No Stress** (>10,000)
- **Vulnerability** (1,500 - 10,000)
- **Scarcity - Stress** (500 - 1,500)
- **Absolute Scarcity** (<500)
- **No Data**

Notes: Blue water availability is defined in terms of total available runoff [4], less the 30% allocated for environmental flows that sustain aquatic ecosystem functioning. Displayed is per capita total annual runoff, at country scale averaged over the period 2010-2019. This means that densely populated countries can demonstrate water stress even though they are not dry hydroclimatically. Source Global Commission on the Economics of Water, 2024

Figure 2: Blue virtual water trade flows

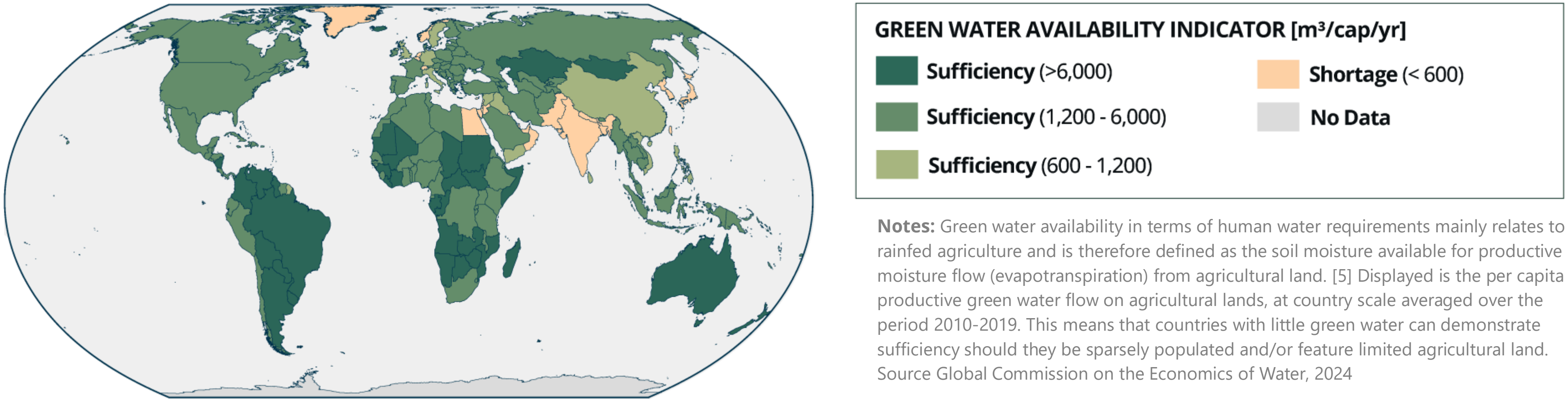




Notes: Annual blue virtual water trade flows by agricultural products. Source: Tuninetti et al. 2017 and Tamea et al. 2021

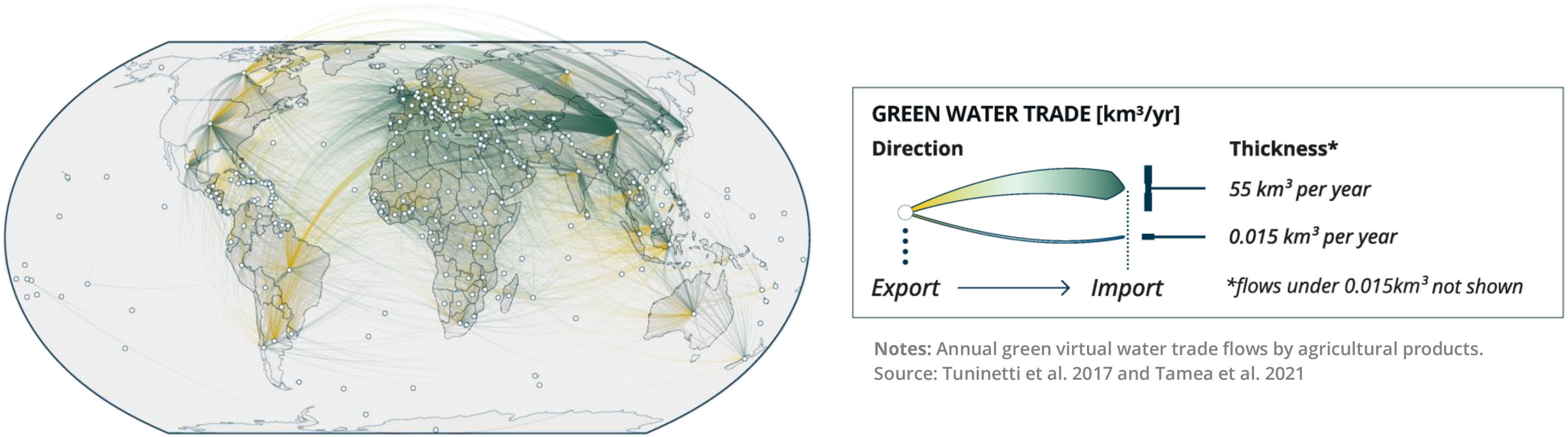
Blue virtual water trade from agricultural products corresponds to the use of blue water for irrigation purposes, but also to a lesser extent the manufacturing of inputs and cooling. 84% of the total virtual water trade is related to ten key crops, whose international trade (virtually) move both green and blue water resources in different proportion. The main staple crops (wheat, soybean, maize, barley) typically show a global blue virtual water proportion lower than 6%, while rice and cotton lint exhibit a blue water content of 30-35%.

Figure 3: Green water scarcity



Notes: Green water availability in terms of human water requirements mainly relates to rainfed agriculture and is therefore defined as the soil moisture available for productive moisture flow (evapotranspiration) from agricultural land. [5] Displayed is the per capita productive green water flow on agricultural lands, at country scale averaged over the period 2010-2019. This means that countries with little green water can demonstrate sufficiency should they be sparsely populated and/or feature limited agricultural land. Source Global Commission on the Economics of Water, 2024

Figure 4: Green virtual water trade flows



Notes: Annual green virtual water trade flows by agricultural products. Source: Tuninetti et al. 2017 and Tamea et al. 2021

Green water embedded in the trade of agricultural products originates from rainfall feeding the fields. It follows that the impact of the green water footprint in the exporting country is different than that of blue water since the use of green water cannot be overused or reallocated as such to other purposes. This means that the impact on water availability in the exporting country of green virtual water trade can be less than that of blue virtual water trade, while the alleviating effect in the importing country remains the same independent of source. However, it is important to consider that expansion of agricultural fields, whether rainfed or irrigated, negatively impact soil moisture and rainfall downwind.

Trade-related risks of undervaluing water

When the pricing of water-intensive commodities does not reflect scarcity and pressure on water resources, demand can intensify water use and contribute to worsening water inequalities and shortages in the producing country. Distortions occur when the opportunity costs of water usage are not considered in the price of traded goods, particularly when water is underpriced or subsidies undermine appropriate pricing signals. Subsidies to water or agricultural production act as *de facto* negative water prices, exacerbating the overuse of water resources.

In many countries, agricultural producers do not pay the full cost of water as governments provide irrigation subsidies and many of the most subsidized crops are also among the most water intensive. This may result in high-value and water-intensive agricultural products, such as avocados and almonds, being grown and irrigated in water-scarce areas, adding to the pressure on local water sources. One striking example is the cultivation of water-intensive cut flowers for exportation in Kenya, which has impacted water levels in Lake Naivasha [5].

A destabilised hydrological cycle will affect global trade

Multiple signs are pointing to a global freshwater crisis. As global warming, land-use changes and poor water management destabilise the water cycle, rainfall patterns are shifting and water extremes such as droughts and floods are intensifying and becoming more frequent. Nearly 3 billion people and more than half of the world's food production are now in areas where water stored on and below the Earth's surface (Total Water Storage) is projected to decline.

Global imbalances in water stores are poised to disrupt global trade. The agricultural sector is distinctively vulnerable to shifts in the hydrological cycle as it directly depends upon rainfall (generated by green water upwind) and the availability of freshwater (blue water for irrigation). An estimated 23% of global cereal production could be lost if irrigation becomes unfeasible where total water storage declines are extreme. Rainfed agriculture dominates both in terms of share of agricultural land and food production and is vulnerable to shifting rainfall patterns. In this context, on the one hand, trade emerges as a strategic tool to meet the nutritional needs of the population in affected water scarce areas; on the other hand, trade patterns and flow are likely to be affected by shifts in total water storage in food-producing countries.

The opportunity of trade agreements and valuing water properly

For trade to contribute to the broader sustainability agenda and increase resilience, robust water policies at the national level and international trade arrangements are required. The World Trade Organisation (WTO) can play a critical role in unlocking the stabilising potential of virtual water trade and getting water economics right. Properly designed trade agreements can balance virtual water trade and cost-effectively achieve food security and water sustainability on a global scale.

However, for trade agreements to play this role, domestic and trade policies must reflect the true value of water, preventing virtual water flows from exacerbating water scarcity and land use change in producing countries and further destabilising the hydrological cycle. At a domestic level, this includes proper pricing of water, shaping property rights and permits to allow allocation which is in the public interest, and addressing water-harmful subsidies.

Repurposing harmful subsidies in agriculture

According to the OECD, USD 629 billion annually (75% of total support) went to individual producers in agriculture either directly from government budgets or through market price support during 2021-23. In total, USD 409 billion were granted in the most potentially distorting measures. [6] Reforming and repurposing agricultural subsidies present a critical opportunity to enhance water conservation. Under the WTO Agreement on Agriculture, support for agricultural producers is divided into different categories depending on the potential distorting effects on production or trade. Subsidies supporting irrigation such as support for the construction of water supply facilities, dams and drainage schemes are generally notified as non-distorting and therefore allowed without limitation.

However, due to a lack of granularity in terms of categorisation, it is difficult to provide an overview of irrigation subsidies. Greater disaggregation of these categories would improve transparency and provide a better basis for informed discussions leading to possible decisions in a subsidy reform process.

While irrigation subsidies directly affect water use, other subsidies, though not specifically aimed at irrigation such as energy or crop-specific subsidies, can indirectly steer producers toward water-intensive crops or extension of agriculture land, often at the expense of more sustainable alternatives. These are frequently categorised as the most trade-distorting. Reforming these subsidies through agricultural negotiations can therefore drive significant improvements in both economic and environmental outcomes by fostering more efficient use of water and other resources. To encourage this change, subsidies need to be amended to provide incentives for the adoption of policies and practices that are better aligned with the (changing) water endowments.

Ensuring an equitable transition

Adjusting trade patterns to increase efficiency and environmental sustainability in global freshwater use can impact local economies and small-scale farmers in water-scarce areas whose livelihoods depend on growing water-intensive crops. Just Water Partnerships can play a critical role in ensuring an equitable transition for these communities to preserve and improve their livelihoods. One example of inspiration is the Fair Water Footprint's partnership in Ica, a desert town in Peru exporting water-intensive fresh produce such as blueberries and asparagus to the United States and Europe. While these exports yield significant economic gains, irrigation has led to a dramatic decline in groundwater availability. Focussing on sustainable water use in the fruit and vegetable sector, the multi-stakeholder partnership is involving retail and governments to collaborate in collective action.

Pathways to harness the potential of virtual water trade

- **Recognise both green and blue water in virtual water trade flows** and develop economic analysis and policies accordingly. This includes considering land use change that affects the hydrological cycle.

- **Mobilise trade agreements so that virtual water trade** contributes to food security and water sustainability on a global scale in just and cost-effective ways.

- **Acknowledge that there are absolute limits to the amount of green and blue water that can be safely and sustainably consumed** and align policy frameworks and instruments with this principle to enhance the efficiency and environmental sustainability of virtual water trade.

- **Strengthen water data and information frameworks and work on common definitions and classification of subsidies** across international organisations, to enable a more coherent approach to the issue and a better understanding of the potential impacts of these subsidies (e.g., on the environment, on farmers).

- **Encourage the repurposing of agricultural subsidies** from production- and trade-distorting measures towards less distortion and improved environmental sustainability. The recentWTO Agreement on Fisheries Subsidies, which is the first WTO agreement with environmental sustainability at its core, serves as an inspirational example of how multilateral cooperation can support reform in this domain.

- **Couple reform with directing support for the transition of farmers and local communities via Just Water Partnerships to ensure equity.**

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Source data virtual water flows

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